CLAIMS

1. A mobile communication system for carrying out a packet transmission based on the spread ALOHA system, the mobile communication system comprising:

a base station that measures an uplink interference value of a transmission path when a data error has occurred in reception packets multiplexed by plurality, generates a retransmission request signal of a packet format based on the measured uplink interference value, and then transmits the retransmission request signal to a mobile communication terminal that has transmitted the erroneous packet, and

a mobile communication terminal that outputs multiplexed transmission data as a transmission packet during a normal transmission, automatically divides the transmission data into parallel signals according to a retransmission multiplex number based on the retransmission request signal when the retransmission request signal has been received, multiplexes the parallel signals to generate a transmission packet for retransmission, and outputs the transmission packet to the base station.

2. The mobile communication system according to claim 1, wherein

the base station generates a retransmission request signal of a packet data format including the uplink

interference value, and transmits the retransmission request signal to the mobile communication terminal that has transmitted the erroneous packet, and

the mobile communication terminal extracts the uplink interference value from the received retransmission request signal, compares the uplink interference value with a predetermined threshold value having a plurality of stages, and determines a retransmission multiplex number according to the uplink interference value based on a result of this comparison.

3. The mobile communication system according to claim 1, wherein

the base station generates a retransmission request signal of a packet data format including the uplink interference value, and transmits the retransmission request signal to the mobile communication terminal that has transmitted the erroneous packet, and

the mobile communication terminal extracts the uplink interference value from the received retransmission request signal, compares the uplink interference value with a predetermined threshold value, does not multiplex the retransmission data when the uplink interference value is lower than the threshold value, and determines a retransmission multiplex number to be in the same number as

the multiplex number during a normal transmission when the uplink interference value is equal to or higher than the threshold value.

4. The mobile communication system according to claim 1, wherein

the base station generates a retransmission request signal of a packet data format including the uplink interference value, and transmits the retransmission request signal to the mobile communication terminal that has transmitted the erroneous packet, and

the mobile communication terminal extracts the uplink interference value from the received retransmission request signal, obtains a probability for determining a retransmission multiplex number based on the uplink interference value, generates a random number of 0 or 1 based on this probability, does not multiplex the retransmission data when the random number is 0, and determines a retransmission multiplex number to be in the same number as the multiplex number during a normal transmission when the random number is 1.

5. The mobile communication system according to claim 1, wherein

the base station compares the uplink interference value

with a predetermined threshold value having a plurality of stages, determines a retransmission multiplex number according to the uplink interference value based on a result of this comparison, generates a retransmission request signal of a packet data format including the retransmission multiplex number, and transmits the retransmission request signal to the mobile communication terminal that has transmitted the erroneous packet, and

the mobile communication terminal extracts the retransmission multiplex number from the received retransmission request signal, and retransmits the transmission data according to the retransmission multiplex number.

6. The mobile communication system according to claim 1, wherein

the base station compares the uplink interference value with a predetermined threshold value, does not multiplex the retransmission data when the uplink interference value is lower than the threshold value, determines a retransmission multiplex number to be in the same number as the multiplex number during a normal transmission when the uplink interference value is equal to or higher than the threshold value, generates a retransmission request signal of a packet data format including the retransmission multiplex number,

and transmits the retransmission request signal to the mobile communication terminal that has transmitted the erroneous packet, and

the mobile communication terminal extracts the retransmission multiplex number from the received retransmission request signal, and retransmits the transmission data according to the retransmission multiplex number.

7. The mobile communication system according to claim 1, wherein

the base station obtains a probability for determining a retransmission multiplex number based on the measured uplink interference value, generates a random number of 0 or 1 based on this probability, does not multiplex the retransmission data when the random number is 0, determines a retransmission multiplex number to be in the same number as the multiplex number during a normal transmission when the random number is 1, generates a retransmission request signal of a packet data format including the retransmission multiplex number, and transmits the retransmission request signal to the mobile communication terminal that has transmitted the erroneous packet, and

the mobile communication terminal extracts the retransmission multiplex number from the received

retransmission request signal, and retransmits the transmission data according to the retransmission multiplex number.

8. The mobile communication system according to claim 1, wherein

the base station obtains a probability for determining a retransmission multiplex number based on the measured uplink interference value, generates a retransmission request signal of a packet data format including the probability, and transmits the retransmission request signal to the mobile communication terminal that has transmitted the erroneous packet, and

the mobile communication terminal extracts the probability from the received retransmission request signal, generates a random number of 0 or 1 based on this probability, does not multiplex the retransmission data when the random number is 0, and determines a retransmission multiplex number to be in the same number as the multiplex number during a normal transmission when the random number is 1.

9. A base station for carrying out a packet transmission based on the spread ALOHA system, wherein

the base station measures an uplink interference value of a transmission path when a data error has occurred in

reception packets multiplexed by plurality, generates a retransmission request signal of a packet format based on the measured uplink interference value, and then transmits the retransmission request signal to a mobile communication terminal that has transmitted the erroneous packet.

10. The base station according to claim 9 comprising:

a data detecting unit that despreads and demodulates the received packet, extracts user data from a demodulated data signal thereby to always monitor a data error in the reception packets, and measures an uplink interference value when there has been a data error;

a retransmission request generating unit that generates a retransmission request signal based on the measured uplink interference value; and

a transmitting unit that converts the retransmission request signal in a packet format.

11. The base station according to claim 9, wherein

the base station generates a retransmission request signal of a packet data format including the uplink interference value, and transmits the retransmission request signal to the mobile communication terminal that has transmitted the erroneous packet.

12. The base station according to claim 9, wherein the base station compares the uplink interference value with a predetermined threshold value having a plurality of stages, determines a retransmission multiplex number according to the uplink interference value based on a result of this comparison, generates a retransmission request signal of a packet data format including the retransmission multiplex number, and transmits the retransmission request signal to the mobile communication terminal that has transmitted the erroneous packet.

13. The base station according to claim 9, wherein the base station compares the uplink interference value with a predetermined threshold value, does not multiplex the retransmission data when the uplink interference value is lower than the threshold value, determines a retransmission multiplex number to be in the same number as the multiplex number during a normal transmission when the uplink interference value is equal to or higher than the threshold value, generates a retransmission request signal of a packet data format including the retransmission multiplex number, and transmits the retransmission request signal to the mobile communication terminal that has transmitted the erroneous packet.

14. The base station according to claim 9, wherein

the base station obtains a probability for determining a retransmission multiplex number based on the measured uplink interference value, generates a random number of 0 or 1 based on this probability, does not multiplex the retransmission data when the random number is 0, determines a retransmission multiplex number to be in the same number as the multiplex number during a normal transmission when the random number is 1, generates a retransmission request signal of a packet data format including the retransmission multiplex number, and transmits the retransmission request signal to the mobile communication terminal that has transmitted the erroneous packet.

15. The base station according to claim 9, wherein

the base station obtains a probability for determining a retransmission multiplex number based on the measured uplink interference value, generates a retransmission request signal of a packet data format including the probability, and transmits the retransmission request signal to the mobile communication terminal that has transmitted the erroneous packet.

16. A mobile communication terminal for carrying out a packet transmission based on the spread ALOHA system, wherein

the mobile communication terminal outputs multiplexed transmission data as a transmission packet during a normal transmission, automatically divides the transmission data into parallel signals according to a retransmission multiplex number determined based on the retransmission request signal when the retransmission request signal has been received, further multiplexes the parallel signals to generate a transmission packet for retransmission, and outputs the transmission packet to the base station.

17. The mobile communication terminal according to claim 16 comprising:

a series-parallel converting unit that converts the internally generated transmission data into parallel signals according to a predetermined multiplex number;

a transmitting unit that spreading modulates the plurality of parallel signals, multiplexes the modulation signals by a predetermined method, and outputs the multiplexed modulation signals as a transmission packet;

a retransmission request detecting unit that receives a retransmission request signal in the packet format, and despreads and demodulates this signal thereby to detect the retransmission request signal; and

a control unit that decides a multiplex number of the parallel signals used by the series-parallel converting unit, based on the retransmission request signal.

18. The mobile communication terminal according to claim 16, wherein

the mobile communication terminal extracts an uplink interference value from the received retransmission request signal, compares this uplink interference value with a predetermined threshold value having a plurality of stages, and determines the retransmission multiplex number according to the uplink interference value based on a result of this comparison.

19. The mobile communication terminal according to claim 16, wherein

the mobile communication terminal extracts the uplink interference value from the received retransmission request signal, compares the uplink interference value with a predetermined threshold value, does not multiplex the retransmission data when the uplink interference value is lower than the threshold value, and determines a retransmission multiplex number to be in the same number as the multiplex number during a normal transmission when the uplink interference value is equal to or higher than the

threshold value.

20. The mobile communication terminal according to claim 16, wherein

the mobile communication terminal extracts the uplink interference value from the received retransmission request signal, obtains a probability for determining a retransmission multiplex number based on the uplink interference value, generates a random number of 0 or 1 based on this probability, does not multiplex the retransmission data when the random number is 0, and determines a retransmission multiplex number to be in the same number as the multiplex number during a normal transmission when the random number is 1.

21. The mobile communication terminal according to claim 16, wherein

the mobile communication terminal extracts the retransmission multiplex number from the received retransmission request signal, and retransmits the transmission data according to the retransmission multiplex number.

22. The mobile communication terminal according to claim 16, wherein

the mobile communication terminal extracts the probability from the received retransmission request signal, generates a random number of 0 or 1 based on this probability, does not multiplex the retransmission data when the random number is 0, and determines a retransmission multiplex number to be in the same number as the multiplex number during a normal transmission when the random number is 1.

23. A retransmission control method for controlling a retransmission between a mobile communication terminal and a base station in a mobile communication system for carrying out a packet transmission based on the spread ALOHA system, the retransmission control method comprising:

a retransmission request signal transmission step of measuring an uplink interference value of a transmission path when a data error has occurred in reception packets multiplexed by plurality, generating a retransmission request signal of a packet format based on the measured uplink interference value, and then transmitting the retransmission request signal to a mobile communication terminal that has transmitted the erroneous packet; and

a retransmission step of automatically dividing the transmission data into parallel signals according to a

retransmission multiplex number based on the retransmission request signal when the retransmission request signal has been received, further multiplexing the parallel signals to generate a transmission packet for retransmission, and outputting the transmission packet to the base station.

24. The retransmission control method according to claim 23, wherein

the retransmission request signal transmission step is for generating a retransmission request signal of a packet data format including the uplink interference value, and transmitting the retransmission request signal to the mobile communication terminal that has transmitted the erroneous packet, and

the retransmission step is for extracting the uplink interference value from the received retransmission request signal, comparing the uplink interference value with a predetermined threshold value having a plurality of stages, and determining a retransmission multiplex number according to the uplink interference value based on a result of this comparison.

25. The retransmission control method according to claim 23, wherein

the retransmission request signal transmission step

is for generating a retransmission request signal of a packet data format including the uplink interference value, and transmitting the retransmission request signal to the mobile communication terminal that has transmitted the erroneous packet, and

the retransmission step is for extracting the uplink interference value from the received retransmission request signal, comparing the uplink interference value with a predetermined threshold value, not multiplexing the retransmission data when the uplink interference value is lower than the threshold value, and determining a retransmission multiplex number to be in the same number as the multiplex number during a normal transmission when the uplink interference value is equal to or higher than the threshold value.

26. The retransmission control method according to claim 23, wherein

the retransmission request signal transmission step is for generating a retransmission request signal of a packet data format including the uplink interference value, and transmitting the retransmission request signal to the mobile communication terminal that has transmitted the erroneous packet, and

the retransmission step is for extracting the uplink

interference value from the received retransmission request signal, obtaining a probability for determining a retransmission multiplex number based on the uplink interference value, generating a random number of 0 or 1 based on this probability, not multiplexing the retransmission data when the random number is 0, and determining a retransmission multiplex number to be in the same number as the multiplex number during a normal transmission when the random number is 1.

27. The retransmission control method according to claim 23, wherein

the retransmission request signal transmission step is for comparing the uplink interference value with a predetermined threshold value having a plurality of stages, determining a retransmission multiplex number according to the uplink interference value based on a result of this comparison, generating a retransmission request signal of a packet data format including the retransmission multiplex number, and transmitting the retransmission request signal to the mobile communication terminal that has transmitted the erroneous packet, and

the retransmission step is for extracting the retransmission multiplex number from the received retransmission request signal, and retransferring the

transmission data according to the retransmission multiplex number.

28. The retransmission control method according to claim 23, wherein

the retransmission request signal transmission step is for comparing the uplink interference value with a predetermined threshold value, not multiplexing the retransmission data when the uplink interference value is lower than the threshold value, determining a retransmission multiplex number to be in the same number as the multiplex number during a normal transmission when the uplink interference value is equal to or higher than the threshold value, generating a retransmission request signal of a packet data format including the retransmission multiplex number, and transmitting the retransmission request signal to the mobile communication terminal that has transmitted the erroneous packet, and

the retransmission step is for extracting the retransmission multiplex number from the received retransmission request signal, and retransferring the transmission data according to the retransmission multiplex number.

29. The retransmission control method according to claim 23, wherein

the retransmission request signal transmission step is for obtaining a probability for determining a retransmission multiplex number based on the measured uplink interference value, generating a random number of 0 or 1 based on this probability, not multiplexing the retransmission data when the random number is 0, determining a retransmission multiplex number to be in the same number as the multiplex number during a normal transmission when the random number is 1, generating a retransmission request signal of a packet data format including the retransmission multiplex number, and transmitting the retransmission request signal to the mobile communication terminal that has transmitted the erroneous packet, and

the retransmission step is for extracting the retransmission multiplex number from the received retransmission request signal, and retransferring the transmission data according to the retransmission multiplex number.

30. The retransmission control method according to claim 23, wherein

the retransmission request signal transmission step is for obtaining a probability for determining a

retransmission multiplex number based on the measured uplink interference value, generating a retransmission request signal of a packet data format including the probability, and transmitting the retransmission request signal to the mobile communication terminal that has transmitted the erroneous packet, and

the retransmission step is for extracting the probability from the received retransmission request signal, generating a random number of 0 or 1 based on this probability, not multiplexing the retransmission data when the random number is 0, and determining a retransmission multiplex number to be in the same number as the multiplex number during a normal transmission when the random number is 1.